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March 4, 1996

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Chairman Reed E. Hundt
Federal Communications Commission
1919 M Street, N.W., Suite 800
Washington, D.C. 20554

Re: ET Docket No. 93-62

Dear Chairman Hundt:

The Federal Communications Commission ("Commission") recently announced its intention to adopt, in April of this year, revised guidelines for evaluating the environmental effects of radiofrequency radiation.[1] In light of the Commission's imminent decision, Hewlett-Packard Company ("HP") wishes to reiterate its strong opposition to adoption of the radiation protection guidelines defined by the National Council on Radiation Protection and Measurements ("NCRP"), as recommended by the United States Environmental Protection Agency ("EPA").

Adoption of the NCRP guidelines would be misguided as a matter of policy and would raise questions about the adequacy of the Commission's decision-making process in this proceeding. Moreover, it would jeopardize the development of new technologies and services in the unlicensed millimeter wave bands, a mere four months after the Commission's groundbreaking efforts to open these frequencies to commercial use.

I. INTRODUCTION

HP is a $25 billion global company that makes more than 20,000 products including computers, test and measurement instruments, electronic components and

1 Pursuant to Section 704(b) of Telecommunications Act of 1996, the Commission must final rules in this proceeding within 180 days of enactment. According to the Commission's Draft Implementation Schedule for S. 652,, action is anticipated to be taken in April. See Draft Implementation Schedule at p. 41 item 35 (rel. Feb. 13, 1996).

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medical equipment and instruments. HP is a leader and innovator in radio-spectrum based technologies and has worked closely with the FCC in a number of spectrum proceedings involving both licensed and unlicensed spectrum, including recent proceedings relating to the 2 GHz, 5 GHz, 28 GHz and above 40 GHz frequency bands.

In particular, HP has been actively involved in, and an ardent supporter of, the Commission's efforts to open the frequency bands above 40 GHz for commercial uses. In response to the Commission's actions in the "Above 40 GHz" proceeding, HP currently is leading the effort to develop an "etiquette" for the 59-64 GHz unlicensed band and is working on a number of projects to make new technologies and new applications available to help people share information and perform a wide range of tasks easily anytime, anywhere.

II. OVERVIEW AND RECOMMENDATIONS

The National Environmental Policy Act of 1969 ("NEPA") requires federal agencies to evaluate the effects of their actions on the quality of the human environment. Currently, the Commission uses a 1982 American National Standards Institute ("ANSI")/Institute of Electrical and Electronic Engineers, Inc. ("IEEE") standard for evaluating the environmental effects of RF exposure from FCC-regulated transmitters and facilities. In a Notice of Proposed Rulemaking ("NPRM") issued in 1993, the Commission proposed to update its guidelines and methods in this area by adopting a more recent 1992 ANSI/IEEE 1992 standard, C95.1-1992.

The Commission's NPRM recognized that "evaluating the biological effects of RF and microwave energy is a complex and controversial subject and that the adoption of new guidelines will raise a number of issues and implementation concerns."[2] As a result, the FCC specifically proposed adoption of the ANSI/IEEE standard and requested comment on a number of detailed issues associated with that standard.[3]

Although the NPRM briefly mentioned alternative RF exposure guidelines, including the NCRP guidelines, it stated that "[t]he 1992 ANSI/IEEE guidelines are the most recent recommendations on RF exposure from the scientific and technical community."[4] Notably, the NPRM did not request comment on whether to abandon the ANSI/IEEE standard in favor of another standard, or on the implementation issues that would be raised if the Commission took such an approach.[5]

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2 Notice of Proposed Rulemaking, ET Docket No. 93-62, 8 FCC Rcd 2849 at ¶ 10 (1993) ("NPRM").
3 NPRM ¶¶ 1, 9, 12-13, 14-18, 19-21, 22.
4 NPRM ¶ 23.
5 See NPRM ¶¶ 24, 25.

The parties submitting comments in this proceeding expressed strong and broad-based support for the Commission's proposal to adopt the revised ANSI/IEEE standard.[6] Support came not only from industry, but also from academia and Federal and state government agencies, including the Department of Defense, the Food and Drug Administration, the Department of Labor's Occupational Safety and Health Administration ("OSHA"), and the Arizona Department of Public Safety.[7] As one of the commenting parties noted, "especially in light of the complexity and controversy surrounding the nature and extent of the biological effects of certain exposures to RF radiation, this unanimity among experts, from such a diverse universe of disciplines, is extraordinary and extraordinarily compelling."[8]

EPA , however, took a different approach, recommending that the FCC adopt the NCRP standard rather than the ANSI/IEEE standard.[9] EPA's recommendation generated both surprise and strong disagreement among the parties. Perhaps most importantly, another Federal agency with responsibility for protecting the lives and health of working Americans — OSHA — rejected EPA's recommendation and urged the FCC to adopt the ANSI/IEEE standard.[10]

Yet despite the FCC's clear original intention to adopt the ANSI/IEEE standard, the strong support expressed by virtually all of the commenting parties for that standard, and the strong opposition to use of the NCRP guidelines, it now

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[6] See, e.g., Reply Comments of the National Association of Broadcasters at 3 ("Virtually all commentors in this proceeding agree that the Commission should adopt ANSI/IEEE C95.1-1992. There is an overwhelming consensus that ANSI/IEEE C95.1-1992 represents the views of a large and diverse group of experts — from all relevant disciplines — working in government, academia and industry. Indeed, most parties agree that the new ANSI standard is the most scientifically up-to-date guideline available."); Reply of GTE at 3-4 ("The overwhelming volume of commenters recognized the conservative nature of the ANSI/IEEE approach. Accordingly, nearly all commenters support the Commission's proposal to use the revised 1992 ANSI/IEEE guidelines as the basis for the agency's RF exposure regulations. Like GTE, most commenters endorse the ANSI/IEE process and approach, and the record reflects a consensus that the ANSI/IEEE C95.1-1992 is the best available standard) (citations to comments of 40 entities in support of the ANSI/IEEE standard omitted); Reply Comments of McCaw Cellular Communications, Inc. at 2-4 (citing 39 parties supporting adoption of the ANSI/IEEE standard and discussing the specific reasons underlying this broad support).

[7] Notably, in the NPRM the Commission had identified both OSHA and the FDA as an "expert health and safety agencies within the Federal Government" from which it intended to solicit comments. Moreover, it had noted the importance of coordinating standards with DoD "in the interest of developing a consistent approach to the treatment of RF exposure environments for the private sector and the Federal Government." NPRM ¶ 11.

[8] Supplement to Reply Comments of the National Association of Broadcasters at i (filed Feb. 23, 1996).

[9] See Letter from Margo T. Oge, Director, Office of Radiation and Indoor Air, EPA to Thomas P. Stanley, Chief Engineer, FCC/OET (dated Nov. 9, 1993).

[10] OSHA Comments ¶1.

appears that the Commission is considering adopting the NCRP guidelines. Such a decision, however, would be unwise as a matter of both law and policy and would have particularly devastating effects upon the development of new technologies and services in the unlicensed millimeter wave bands above 40 GHz.

HP, therefore, strongly urges the Commission to adopt the ANSI/IEEE C95.1-1992, as originally proposed in the NPRM. If, however, the Commission is inclined to adopt the NCRP guidelines, in whole or in part, HP urges the Commission to adopt one of the following alternatives with respect to the unlicensed millimeter meter wave bands:

1) Defer specifying close range power density limits for the 59-64 GHz band until scientific data are available to support a particular power density level.[11] Limits for the 59-64 GHz band could be specified in conjunction with the Commission's adoption of operational rules or a spectrum etiquette for this band.

2) Adopt an exemption for SAR testing of low power devices based upon the current provision at 47 C.F.R. § 15.319(i).

3) Clarify the NCRP recommended lmw/cm^2 power density level to specify that the distance measured to arrive at the level is 28 cm, in correspondence with the FCC-prescribed EIRP power levels.[12]

4) Issue a public notice or further notice of proposed rulemaking stating the Commission's intention to adopt the NCRP guidelines and requesting specific comment on these guidelines, with particular attention paid to the limitations with and shortcomings of the NCRP guidelines that were identified in the comments and reply comments filed in this proceeding.

III. THE NCRP GUIDELINES ARE SERIOUSLY FLAWED, ARBITRARILY SET LIMITS THAT LACK SCIENTIFIC BASIS, AND ARE NOT RELEVANT TO MILLIMETER WAVE RF RADIATION.

Under the Administrative Procedure Act ("APA"), agency action must not be "arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with

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[11] See Letter from Cynthia Johnson, Government Affairs Manager, HP, to Chairman Reed Hundt, FCC, dated August 4, 1995 (discussing lack of scientific data for health effects at 59-64 GHz and describing a research project on the safety of millimeter wave exposure being conducted by Dr. Henry Kues of Johns Hopkins University).

[12] The Commission's First Report and Order in ET Docket No. 94-124 (rel. Dec. 15, 1995) ¶¶ 38-40, effectively establishes a 10W EIRP level for systems in the 59-64 GHz band, but specifies this in an equivalent unit of measure, *i.e.*, 9 MuW/cm^2 at a distance of 3 meters.

law."[13] Although agencies are accorded substantial deference, their decisions must nonetheless reflect "reasoned decisionmaking based on evidence in the record."[14] Adoption by the FCC of the NCRP standard would fail to meet this test.

As detailed below and in the record in this proceeding, the NCRP guidelines suffer from a number of serious flaws when compared to the ANSI/IEEE standard. Moreover, if adopted, the NCRP standard would be impractical to apply to millimeter wave band technologies and would have a chilling effect on further product development. Thus, application of the NCRP standard to the millimeter wave band would be arbitrary and capricious on the merits.

A. There Is No Scientific Basis To Support Application Of The NCRP Standards To Millimeter Wave Band Technologies.

The health effects of 59-64 GHz millimeter wave RF radiation have not, to date, been the subject of any serious scientific study. Consequently, any conclusion regarding the safety of various power density levels in this band are necessarily based on nothing but extrapolation and speculation. The NCRP standards suffer, in particular, from this weakness.

The fundamental flaw in the NCRP guidelines is that the NCRP report was based on studies done of RF radiation in other frequency bands, which provide no basis for scientifically defensible conclusions regarding the effects of millimeter wave RF radiation. In order to arrive at its recommended power density level, NCRP adopted the ANSI 1982 curve for occupational exposure. This ANSI curve uses a unit of measure called the Specific Absorption Rate ("SAR"), which measures energy absorbed per unit of body mass with various masses from whole body down to 1 gram as averaging volumes. Millimeter waves, however, penetrate less than 1mm into human tissue and do not heat the body mass in the same way that conventional radio frequency fields do. There simply is no correlation between SAR as a unit of measure and millimeter wave exposure. SAR-derived exposure criteria, therefore, are inappropriate.

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[13] 5 U.S.C. § 706(2)(A).

[14] See, e.g., Steel Mfrs. Assn. v. EPA, 27 F.3d 642, 646 (D.C. Cir. 1994); cf. .Chevron U.S.A., Inc. v. Natural resources Defense Council, Inc., 467 U.S. 837, 842-45 (1984). The inquiry at the second step of Chevron overlaps analytically with the court's review under the APA's "arbitrary and capricious" standard. See, e.g., General Am. Trans.. Corp. v. ICC, 872 F.2d 1048, 1053 (D.C. Cir. 1989) ("[T]he questions posed — has the Commission adopted an impermissible construction of the Act and is its ... policy arbitrary and capricious — are quite similar. Both questions require us to determine whether the Commission, in effecting a reconciliation of competing statutory aims, has rationally considered the factors deemed relevant by the Act."), cert. denied, 493 U.S. 1069 (1990); see also Silberman, Chevron — The Intersection Of Law And Policy, 58 Geo. Wash. L. Rev. 821, 827-28 (1990).

It would appear that NCRP recognized the problem of using SAR as a unit of measure as it, too, questioned its validity "at special extremes of frequency [where there is] the possibility of severe deviation from uniformity of energy deposition."[15] Notwithstanding its own concerns with the SAR measure, NCRP adopted the ANSI exposure curve which is based on the theory that 0.4W/kg SAR is an acceptable limit for the amount of heating workers receive when immersed in a field of radio frequencies. This then results in a power density limit of 5mW/cm^2.

In addition to its technical weaknesses, the NCRP guidelines are premised upon highly questionable assumptions. After determining that people work only one-fifth of the time, NCRP concluded that the workplace limits should simply be divided by five in order to ensure the same protection beyond the workplace. This "leap of logic" yields a limitation of 1mW/cm^2 based on nothing more than a arbitrarily-set formula.

Similarly, NCRP assumed that, because society as a whole is larger than the working population, the more conservative limitation is necessary. This might be true if the Commission were dealing with an at-large, environmental pollutant; in this case, however, the RF radiation at issue will emanate from electronic equipment of low power that is used voluntarily by consumers. NCRP's assumption simply does not follow from a valid logical syllogism.

Finally, the NCRP report completely fails to connect its own literature review with its power density recommendations made in Section 17. No reasons are presented in the NCRP report to explain or justify the recommendations and conclusions. Therefore, these recommendations cannot be considered to be the product of scientific method. As is apparent from even a cursory review of the report, not a single peer-reviewed paper on millimeter waves was referenced. The single source of support for the NCRP conclusions with reference to millimeter waves is a paper authored by Rosenthal, *et al*, in 1976 entitled "Effects of 35 and 107 GHz CW Microwaves on the Rabbit Eye," which was not a peer-reviewed article. This, in combination with the age and obscurity of the source, raises questions about any conclusions based upon the article.

All of these flaws demonstrate that the Commission should not rely on the NCRP report to establish actual millimeter wave RF radiation regulations for the industry. Indeed, as a purely academic matter, the NCRP report has not even been subject to true peer-review. The NCRP report was, in fact, subject to a much more casual review than any ordinary scientific paper would undergo. According to NCRP staff, the recommendations simply were reviewed by unnamed NCRP Council members who may or may not be experts in this field. In short, the NCRP report does

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[15] NCRP at p. 277.

not even constitute a conclusive academic study of the problem at this stage and, therefore, it should not be used to guide an industry.

B. Application Of The NCRP Standards To Millimeter Wave Band Technologies Will Impose Burdens That Will Far Outweigh Any Resulting Public Health Benefit.

When it allocated spectrum at 59-64 GHz for commercial uses, the Commission justifiably was optimistic about the wide variety of new technologies and services that would result. By imposing the ill-suited and overly-restrictive NCRP guidelines on the millimeter wave bands, however, the Commission will jeopardize the development of these new technologies and services.

This lost opportunity would occur without achieving any significant benefit to human safety. As set forth above, the methodology used to arrive at the conclusion in the NCRP report simply is not relevant to the millimeter wave band. Furthermore, in practical terms, the FCC already has set Equivalent Isotropically Radiated Power ("EIRP") power limits that reduce power density to a level that is equivalent to the NCRP recommendations if measured at 28 cm (or about 1 foot) from the RF source. The NCRP recommendations are effectively open-ended with respect to measurement distances and, as a result, would be completely impractical to apply.

IV. THE RECORD IN THIS PROCEEDING DOES NOT PROVIDE AN ADEQUATE BASIS FOR ADOPTION OF THE NCRP GUIDELINES.

Following EPA's comments and in response to indications by FCC staff that the Commission was seriously considering adopting the NCRP guidelines, HP and several other parties have endeavored to bring to the Commission's attention the fundamental flaws with the EPA/NCRP approach. While the record thus contains a limited discussion of the wisdom of adopting the NCRP guidelines, this proceeding has not benefited from the type of open, on-the-record debate envisioned by the APA.

As set forth above, the NPRM focused almost exclusively on the ANSI/IEEE standard and expressed a clear intention to adopt that standard. It devoted pages of text to a discussion of, and request for comments on, the technical questions relating to implementation of the ANSI/IEEE standard. The only mention of the NCRP guidelines was near the end of the NPRM, in a section dealing with alternative RF exposure guidelines — which, notably, devoted one of its three paragraphs to a discussion of why the ANSI/IEEE standard was the most appropriate standard.[16]

Even in the section mentioning the NCRP guidelines, moreover, the NPRM did not propose adopting these guidelines. Rather, it first noted that standards adopted

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[16] NPRM ¶¶ 24-25.

by NCRP and by the International Radiation Protection Association ("IRPA") differed from the ANSI/IEEE guidelines on the question of the appropriate exposure standard in certain high frequencies (for NCRP, from 15-300 GHz; for IRPA, from 1.5-300 GHz) and requested comment on "whether these differences are significant and whether there is a need to adopt exposure requirements different than those contained in the ANSI/IEEE guidelines."[17] Second, it noted that the NCRP guidelines include a special provision with respect to modulated RF frequencies and requested comment on the importance of this aspect of the NCRP guidelines.[18]

The Commission no where indicated that it proposed, or was even considering, adopting the NCRP standards *in toto*. Consequently, the myriad issues raised by the NCRP standard — not the least of which is whether there is any basis to apply the NCRP standard to millimeter wave technologies — went largely unaddressed in the comments. Nonetheless, it appears now that the Commission is prepared to adopt the NCRP standard, either in whole or in substantial part.

This abrupt change in the Commission's RF radiation hazard regulations raises serious questions about the adequacy of the Commission's decision-making process. Under Section 553 of the APA, agencies must, with few exceptions, provide notice and an opportunity to comment before promulgating any final rule.[19] Where, as in this case, an agency intends to adopt a rule that differs from the rule proposed, the adequacy of the notice is measured by whether "the final rule is the logical outgrowth of the one proposed."[20]

This "logical outgrowth" requirement serves important public interest purposes in that it helps to ensure that interested parties and the public have notice of "sufficient detail" to participate meaningfully in the rulemaking process.[21] That is, the Commission must "describe the range of alternatives being considered with reasonable specificity. Otherwise, interested parties will not know what to comment on, and notice will not lead to better-informed agency decisionmaking."[22]

In this case, the notice provided by the Commission in the 1993 NPRM was inadequate. Although the NCRP standard generally deals with the same subject matter as was at issue in the NPRM, the NPRM did not begin to identify or request

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17 NPRM ¶ 24.
18 NPRM ¶ 25.
19 5 U.S.C. § 553(b).
20 Small Refiners Lead Phase-Down Task Force v. EPA, 705 F.2d 506, 546 (D.C. Cir. 1983); Fertilizer Inst. v. EPA, 935 F.2d 1303, 1311 (D.C. Cir. 1991).
21 Horsehead Resource Development Co. v. Browner, 16 F.3d 1246, 1268 (D.C. Cir. 1994)
22 Small Refiners Lead Phase-Down Task Force, 705 F.2d at 549.

comment on the numerous issues implicated by adoption of the NCRP standard[23] — something that is essential in an area as complex as technical standards. Further, the D.C. Circuit has made it quite clear that the comments of the parties do not constitute adequate notice. "Ultimately, notice is the Agency's duty because comments by members of the public would not in themselves constitute adequate notice. Under the standards of the APA, notice necessarily must come — if at all— from the Agency."[24]

Accordingly, unless the Commission is willing to adopt the ANSI/IEEE standard, as originally proposed, it should issue a public notice or further notice of proposed rulemaking specifically identifying its intention to adopt the NCRP guidelines and giving interested parties an opportunity to submit comments in response to this proposal. The 180-day deadline within which the FCC must complete this proceeding provides enough time to take this important step and, by so doing, to ensure that the Commission adopts the best and most appropriate standard for regulating RF hazards.

CONCLUSION

For the reasons discussed above and in HP's other submissions in this proceeding, HP strongly urges the Commission to adopt the ANSI/IEEE C95.1-1992, as originally proposed in the NPRM. If, however, the Commission is inclined to adopt the NCRP guidelines, in whole or in part, HP urges the Commission to adopt one of the following alternatives with respect to the unlicensed millimeter meter wave bands:

1) Defer specifying close range power density limits for the 59-64 GHz band until scientific data are available to support a particular power density level.[25] Limits for the 59-64 GHz band could be specified in conjunction with the Commission's adoption of operational rules or a spectrum etiquette for this band.

2) Adopt an exemption for SAR testing of low power devices based upon the current provision at 47 C.F.R. § 15.319(i).

3) Clarify the NCRP recommended lmw/cm^2 power density level to specify that the distance measured to arrive at the level is 28 cm, in correspondence with the FCC-prescribed EIRP power levels.

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[23] See Kooritzky v. Reich, 17 F.3d 1509, 1514 (D.C. Cir. 1994) (mere interrelation between the rule adopted and rules proposed does not satisfy the notice and comment requirements of the APA).

[24] Horsehead, 16 F.3d at 1268.

[25] See Letter from Cynthia Johnson, Government Affairs Manager, HP, to Chairman Reed Hundt, FCC, dated August 4, 1995 (discussing lack of scientific data for health effects at 59-64 GHz and describing a research project on the safety of millimeter wave exposure being conducted by Dr. Henry Kues of Johns Hopkins University).

4) Issue a public notice or further notice of proposed rulemaking stating the Commission's intention to adopt the NCRP guidelines and requesting specific comment on these guidelines, with particular attention paid to the limitations with and shortcomings of the NCRP guidelines that were identified in the comments and reply comments filed in this proceeding.

Sincerely,

Cynthia Johnson

Cynthia Johnson
Government Affairs Manager
Hewlett-Packard Company

cc: Commissioner Andrew C. Barrett
Commissioner Rachelle B. Chong
Commissioner Susan Ness
Commissioner James H. Quello
Mr. Richard M. Smith